

# Comparison of Canadian Pharmacy Education and Practice Standards with Accreditation Standards of the Canadian Pharmacy Residency Board

Henry Halapy and Salma Satchu

## INTRODUCTION

In the past decade, Canadian pharmacy education and training programs have adopted competency-based frameworks for practice and education. However, there remains a lack of standardization and harmony across the multiple sets of standards that guide pharmacy practice and education. In addition to various provincial standards, there are currently 3 national standards of practice governing the development of a pharmacist practitioner through the continuum of learning and career development: the 2010 standards of the Canadian Pharmacy Residency Board (CPRB),<sup>1</sup> the 2010 educational outcomes of the Association of Faculties of Pharmacy of Canada (AFPC),<sup>2</sup> and the 2014 professional competencies for Canadian pharmacists at entry to practice outlined by the National Association of Pharmacy Regulatory Authorities (NAPRA).<sup>3</sup> The AFPC educational outcomes define expected performance for students upon completion of their first professional degree program in pharmacy. The NAPRA competencies outline the requirements of pharmacists at the point of licensure, whereas the CPRB standards outline the expectations upon completion of a pharmacy practice residency.

Currently, these 3 sets of standards function independently, thereby creating the potential for confusion, duplication, and scattering of efforts. Instead, a thoughtfully developed, unified set of standards spanning the continuum of practice, from undergraduate learning through to continuing professional education, might better facilitate professional cohesion and long-term career development.<sup>4,5</sup> Accompanying a unified overarching standard of practice, a clear articulation of performance levels and ranges of practice contexts is required for each stage of practitioner development.<sup>6-8</sup> Such a document would

help to translate the unified overarching standard of practice into a practical model for education and assessment.<sup>9</sup>

Standards alignment has been called for in other disciplines, such as medicine, audiology, speech-language pathology, physiotherapy, and nursing.<sup>10-17</sup> The medical profession in Canada has produced not only a unified set of competency-based standards (known as CanMEDS) for all of its 67 medical subspecialties, but also milestones intended to support the continuum of learning and practice from the undergraduate level to retirement. The milestones, which articulate performance levels and ranges of practice contexts, serve to translate CanMEDS into a practical model of education and assessment.<sup>4,8,13</sup> Because no such overarching, aligned standard of practice exists in pharmacy, the first step in alignment involves a foundational comparison of similarities and differences among the existing standards.<sup>18</sup> The purpose of the analysis described here was to compare the 3 sets of national standards for pharmacy education and practice.

## METHODS

To compare the existing pharmacy standards, all competencies (i.e., the AFPC roles and NAPRA competency categories) and the 6 CPRB educational outcomes pertaining to training and practice (i.e., outcomes 3.1 to 3.6) were compared for similarities and differences, with application of methods for comparison previously used in the general education and health care literature (as described below).<sup>17-20</sup> Competencies in one standard were matched, or mapped, to the equivalent competencies in another standard, with the residency standards being the constant common comparator (because of the residency perspective of the authors). One comparison was made between

the CPRB and AFPC standards, and a second comparison was made between the CPRB and NAPRA standards. Because the authors were interested primarily in residency training, the AFPC and NAPRA standards were not compared directly. For the purpose of analysis, all standards and substandards were considered as stand-alone elements; whenever present, a substandard was considered independently from its parent standard and was counted as a unique entity.

### Analysis and Scoring

As part of the comparative mapping of competencies, the authors assessed the degree of alignment across the 3 sets of standards using a scoring system similar to what has been used previously in the educational literature.<sup>19</sup> Substandards were compared for similarity in 3 areas: language and terminology, stated intention, and degree of specificity (Table 1). Any degree of similarity was considered a “match”, to show the points of alignment between the standards. Each substandard from the AFPC and NAPRA was given a matching score of 0 to 3, to assign the degree of matching (or similarity) between it and each CPRB standard. The matching scores were subsequently used to determine the percent alignment score, or overall degree of alignment, for each competency, as described in Appendix 1. A higher percent alignment score was deemed to indicate greater alignment between competencies across standards.

The process was repeated for all competencies in a given set of standards, and an overall standards alignment score was calculated for each set of standards. All scoring and mapping of competencies was completed independently by 2 residency coordinators (H.H., S.S.), who then held a series of meetings to jointly review the results and reach consensus. Neither of the residency coordinators had been involved in writing the original CPRB standards.

## RESULTS

Significant differences were noted, in terms of nomenclature and structure, among the sets of standards. The 7 AFPC

**Table 1. Scoring System for Comparing Standards of the CPRB with AFPC Roles and NAPRA Competencies**

| Score | Definition*  |
|-------|--|
| 0     | No match in any of the 3 areas of comparison       |
| 1     | Weak match: match in 1 of 3 areas of comparison    |
| 2     | Partial match: match in 2 of 3 areas of comparison |
| 3     | Complete match: match in all 3 areas of comparison |

AFPC = Association of Faculties of Pharmacy of Canada, CPRB = Canadian Pharmacy Residency Board, NAPRA = National Association of Pharmacy Regulatory Authorities.

\*The 3 areas of comparison were language and terminology, stated intention, and degree of specificity.

educational outcomes are described as “roles”, each containing 3 to 10 unlabelled statements, with 0 to 9 associated substatements describing in more detail the specific elements required for competency. Each of the 9 NAPRA “competency categories” is divided into 1 to 8 “key competencies”, and each key competency is further subdivided into 2 to 9 “enabling competencies”. The CPRB accreditation standards pertaining to resident performance list 6 “educational outcomes” (numbered 3.1 to 3.6), henceforth referred to as “outcomes”, each with 1 to 5 associated “requirements” for fulfillment (Table 2).

The quantitative assessment of the AFPC standards against the CPRB standards yielded a standards alignment score of 34.1% (Table 3). The areas of strongest alignment were the AFPC’s *scholar* role (percent alignment score 50.7%) and *care provider* role (percent alignment score 45.7%). The *advocate* and *communicator* roles showed the weakest alignment with CPRB standards (percent alignment scores of 13.9% and 16.7%, respectively). In the assessment of the NAPRA standards against the CPRB standards, the standards alignment score was 26.4%, with the *knowledge and research application* and *communication and education* competency categories showing the strongest alignment with the CPRB educational outcomes (percent alignment scores of 47.2% and 41.0%, respectively) (Table 4). The areas of weakest alignment were the competency categories of *quality and safety* (4.8%); *ethical, legal, and professional responsibilities* (5.6%); and *health promotion* (7.4%).

**Table 2. Nomenclature and Structure of the 3 Sets of Standards**

| AFPC Educational Outcomes <sup>2</sup><br>(7 Roles)   | CPRB Accreditation Standards <sup>1</sup><br>(6 Educational Outcomes)  | NAPRA Competencies <sup>3</sup><br>(9 Competency Categories)  |
|---|--|---|
| <ul style="list-style-type: none"> <li>• Care provider</li> <li>• Communicator</li> <li>• Collaborator</li> <li>• Manager</li> <li>• Advocate</li> <li>• Scholar</li> <li>• Professional</li> </ul> | <ul style="list-style-type: none"> <li>• Provide direct patient care as members of interprofessional teams (outcome 3.1)</li> <li>• Manage and improve medication use systems (outcome 3.2)</li> <li>• Exercise leadership (outcome 3.3)</li> <li>• Exhibit ability to manage one’s own practice (outcome 3.4)</li> <li>• Provide medication- and practice-related education (outcome 3.5)</li> <li>• Demonstrate project management skills (outcome 3.6)</li> </ul> | <ul style="list-style-type: none"> <li>• Ethical, legal, and professional responsibilities</li> <li>• Patient care</li> <li>• Product distribution</li> <li>• Practice setting</li> <li>• Health promotion</li> <li>• Knowledge and research application</li> <li>• Communication and education</li> <li>• Intra- and inter-professional collaboration</li> <li>• Quality and safety</li> </ul> |

AFPC = Association of Faculties of Pharmacy of Canada, CPRB = Canadian Pharmacy Residency Board, NAPRA = National Association of Pharmacy Regulatory Authorities.

**Table 3. Quantitative Comparison of AFPC Roles<sup>2</sup> against CPRB Accreditation Standards<sup>1</sup>**

| Measure                 | AFPC Role; Score in Relation to CPRB Accreditation Standards |                 |                  |                  |                 |                  |                   | Total                       |
|-------------------------|--|-----------------|------------------|------------------|-----------------|------------------|-------------------|-----------------------------|
|                         | Care Provider  | Communicator    | Collaborator     | Manager          | Advocate        | Scholar          | Professional      |                             |
| No. of substandards*    | 43   | 14              | 21               | 21               | 12              | 23               | 34                | 168                         |
| Sum of matching scores  | 59   | 7               | 13               | 17               | 5               | 35               | 36                | 172                         |
| Percent alignment score | 45.7%<br>(59/129)  | 16.7%<br>(7/42) | 20.6%<br>(13/63) | 27.0%<br>(17/63) | 13.9%<br>(5/36) | 50.7%<br>(35/69) | 35.3%<br>(36/102) | 34.1%<br>(172/504)<br>(SAS) |

AFPC = Association of Faculties of Pharmacy of Canada, CPRB = Canadian Pharmacy Residency Board, SAS = standards alignment score.

\*For each substandard, the maximum possible score was 3 (see Table 1).

**Table 4. Quantitative Comparison of NAPRA Competencies<sup>3</sup> against CPRB Accreditation Standards<sup>1</sup>**

| Measure                 | NAPRA Competency; Score in Relation to CPRB Accreditation Standards |                   |                      |                  |                  |                                    |                             |                  |                    | Total                       |
|-------------------------|---|-------------------|----------------------|------------------|------------------|------------------------------------|-----------------------------|------------------|--------------------|-----------------------------|
|                         | ELP Responsibilities*   | Patient Care      | Product Distribution | Practice Setting | Health Promotion | Knowledge and Research Application | Communication and Education | Collaboration†   | Quality and Safety |                             |
| No. of substandards‡    | 18  | 36                | 8                    | 10               | 9                | 12                                 | 13                          | 14               | 14                 | 134                         |
| Sum of matching scores  | 3   | 37                | 8                    | 6                | 2                | 17                                 | 16                          | 15               | 2                  | 106                         |
| Percent alignment score | 5.6%<br>(3/54)  | 34.3%<br>(37/108) | 33.3%<br>(8/24)      | 20.0%<br>(6/30)  | 7.4%<br>(2/27)   | 47.2%<br>(17/36)                   | 41.0%<br>(16/39)            | 35.7%<br>(15/42) | 4.8%<br>(2/42)     | 26.4%<br>(106/402)<br>(SAS) |

CPRB = Canadian Pharmacy Residency Board, NAPRA = National Association of Pharmacy Regulatory Authorities, SAS = standards alignment score.

\*Ethical, legal, and professional responsibilities.

†Intra- and inter-professional collaboration.

‡For each substandard, the maximum possible score was 3 (see Table 1).

Table 5 shows the location of alignment of the AFPC roles and the NAPRA competency categories with each CPRB outcome. All 7 of the AFPC roles and all 9 of the NAPRA competency categories mapped to one or more CPRB educational outcomes. Although there was frequent and recurrent mapping to CPRB outcomes 3.1 to 3.5, only the AFPC scholar role mapped to CPRB outcome 3.6 (*project management*). Six of the 7 AFPC roles mapped to more than one CPRB outcome. The AFPC *collaborator* and *scholar* roles mapped to 5 and 6 CPRB outcomes, respectively. Conversely, the *communicator* role mapped to only 1 CPRB outcome (outcome 3.5, *provision of medication- and practice-related education*). Three of the 9 NAPRA competency categories mapped to just 1 CPRB outcome, 4 mapped to 2 CPRB outcomes, and 2 mapped to 3 CPRB outcomes (Table 5).

All 3 sets of standards address the provision of patient care as a specific and distinct area of focus, with the majority of AFPC roles and NAPRA competency categories showing some degree of matching to CPRB's outcome 3.1, *direct patient care*. Communication is articulated as an entity of its own in the standards of both AFPC and NAPRA. However, in the CPRB standards, communication-related competencies are interspersed throughout the various outcomes, specifically being mentioned in outcomes 3.1, 3.2, 3.5, and 3.6. Similarly, collaboration is addressed as a singular practice domain in both the AFPC and

NAPRA standards, but is more widely interspersed throughout different elements of CPRB outcomes 3.1, 3.2, 3.3, 3.4, and 3.5.

Several areas of practice are discussed at length in both the AFPC and NAPRA standards without any corresponding discussion in CPRB. These include personnel supervision (AFPC standard 4.4, NAPRA standard 4.1.2), physical assessment (AFPC standards 1.2.4 and 1.8.1, NAPRA standard 2.7.1), and health promotion/wellness (AFPC standard 5.2, NAPRA competency category 5). Direct dispensing/distribution is addressed at both a technical level and a managerial level by NAPRA (standards 3.1, 4.1, and 4.2), whereas it is discussed solely from a manager's perspective by the AFPC (standard 4.2), and from a medication system perspective by the CPRB (outcome 3.2).

All 3 sets of standards address the provision of education in the contexts of direct patient care and general education through presentations. CPRB additionally describes practice-based teaching based on the 4 roles of direct instruction, facilitation, modelling, and coaching. The idea of practice-based teaching is addressed in AFPC professionalism standard 7.5.2 (through mentorship/preceptorship) but is essentially absent from the NAPRA standards.

Other noteworthy differences relate to practice management and leadership. The concept of managing one's own practice is emphasized in the CPRB standards as a single outcome

**Table 5. Alignment of the AFPC and NAPRA Standards with CPRB Accreditation Standards**

| Care Provider | AFPC Educational Outcomes <sup>2</sup><br>7 Roles |                |         |          |         |                |   | CPRB Accreditation Standards <sup>1</sup><br>6 Educational Outcomes |              |                        |                  |                  | NAPRA Professional Competencies <sup>3</sup><br>9 Competency Categories |                               |  |                    |  |  |  |  |  |
|---------------|---|----------------|---------|----------|---------|----------------|---|---|--------------|------------------------|------------------|------------------|---|-------------------------------|--|--------------------|--|--|--|--|--|
|               | Communi- cator                                    | Collabor- ator | Manager | Advocate | Scholar | Profes- sional |   | Ethical, Legal, and Professional Responsibilities                   | Patient Care | Product Distribu- tion | Practice Setting | Health Promotion | Knowledge and Research Appli- cation                                    | Communi- cation and Education | Intra- and Inter- Professional Collabor- ation | Quality and Safety |  |  |  |  |  |
| •             | •   | •              | •       | •        | •       | •              | • | •   | •            | •                      | •                | •                | •   | •                             | •  | •                  |  |  |  |  |  |
| •             | •   | •              | •       | •        | •       | •              | • | •   | •            | •                      | •                | •                | •   | •                             | •  | •                  |  |  |  |  |  |
|               |   |                |         |          |         |                |   |   |              |                        |                  |                  |   |                               |  |                    |  |  |  |  |  |
|               |   |                |         |          |         |                |   |   |              |                        |                  |                  |   |                               |  |                    |  |  |  |  |  |
|               |   |                |         |          |         |                |   |   |              |                        |                  |                  |   |                               |  |                    |  |  |  |  |  |
|               |   |                |         |          |         |                |   |   |              |                        |                  |                  |   |                               |  |                    |  |  |  |  |  |
|               |   |                |         |          |         |                |   |   |              |                        |                  |                  |   |                               |  |                    |  |  |  |  |  |

AFPC = Association of Faculties of Pharmacy of Canada, CPRB = Canadian Pharmacy Residency Board, NAPRA = National Association of Pharmacy Regulatory Authorities.

(outcome 3.4) dedicated to the idea of continuous self-development, practice advancement, and time management. This outcome correlates with AFPC standards 4.1 (day-to-day time management and balancing of priorities) and 7.3 (maintaining competence through life-long learning) and NAPRA standard 1.4.4, which addresses continuous professional development under the theme of professionalism. Leadership is discussed in the AFPC and NAPRA standards in the context of team collaboration, whereas the concept of leadership is addressed more broadly in the CPRB standards (outcome 3.3, *exercise leadership*) as a mode of practice that emphasizes project management.

## IMPLICATIONS AND SIGNIFICANCE OF RESULTS

To the authors' knowledge, this study represents the first formal comparison of pharmacy education and practice standards. The results show that although there are some conceptual commonalities among the 3 sets of standards, there are also redundancies and omissions, which make it challenging to apply the standards in their current forms to the continuum of learning of pharmacy practitioners. In the quantitative analysis, the standards alignment score between the AFPC and CPRB standards was 34.1%, with the strongest alignment relating to the AFPC's *care provider* and *scholar* roles; the weakest alignment was seen for the AFPC's *communicator* and *advocate* roles. The standards alignment score between the NAPRA and CPRB standards was 26.4%, with the strongest alignment relating to NAPRA's *knowledge and research application* and *communication and education* competency categories; the weakest alignment was seen for the competency categories of *health promotion; ethical, legal, and professional responsibilities*; and *quality and safety*.

This comparative analysis provides insight into the similarities and differences among the 3 sets of standards but was not designed or intended to explain *why* the standards are similar or different. Although there are, in fact, a number of commonalities across the 3 sets of standards, these similarities were not readily apparent without in-depth analysis. In a similar comparative analysis, Andrew and others<sup>18</sup> specifically compared the standards for undergraduate and postgraduate medical education in Canada. They demonstrated significant nonalignment of the standards, with an overall alignment value of less than 50%. Like Andrew and others,<sup>18</sup> we found that comparison across standards was not easy because of the different terminologies and formats used in each document. In particular, the pharmacy standards use different terms to describe similar things; for example, terms such as "roles", "outcomes", "competencies", and "competency categories" are all used to describe performance expectations at a very high level. In addition, there are also different numbers of substandards embedded within

each set of standards, different presentation formats, and different numbering systems across the standards.

These results have implications for the design of residency standards and therefore, ultimately, for the design and assessment of residency curricula. For example, the term "communication" is discussed in all 3 sets of standards, with various definitions of what "communication" entails. Skills related to communication are articulated as entities of their own in both the AFPC and NAPRA standards, but are interspersed throughout different sections of the CPRB standards. Similarly, collaboration is discussed as an entity of its own in the AFPC and NAPRA standards, but is interspersed throughout different sections of the CPRB standards. Given that both communication and collaboration are also important skills in residency training, more attention could be paid to them through explicit description in the CPRB standards. Similarly, the AFPC role (*advocate*) and NAPRA competency categories (*quality and safety; ethical, legal, and professional responsibilities; health promotion*) showing weakest alignment with CPRB standards could be considered for greater elaboration in the CPRB standards. Explicit inclusion of these skills in the design and assessment of residency curricula could help to ensure residents' competence.

Ultimately, discrepancies in content and format among the 3 standards prevent adequate support of cohesive and ongoing professional development through the continuum of learning. Thoughtful alignment of standards could better facilitate pharmacy education, assessment of learners and practitioners, and practitioner development.<sup>4,10,11</sup> In contrast to the situation for pharmacy, there has been a movement to standardize education and career development across the spectrum in other health care professions.<sup>12-16</sup> Furthermore, an international process of alignment of standards has been undertaken in occupational therapy, based on a comparison of standards across 10 countries.<sup>21,22</sup> Core competencies have been amalgamated for medicine, nursing, physical therapy, and occupational therapy to support harmonization of these competencies into a framework for interprofessional education.<sup>17</sup>

Because the current analysis was focused on residency training, a direct comparison between the AFPC and NAPRA standards was not completed. Such a comparison could help to align and potentially streamline entry-to-practice pharmacy training and education. Although some provinces have their own standards for pharmacy practice competency, only national standards were considered for this analysis, because of their more universal applicability. The analysis was completed by residency coordinators, but different results might have been obtained if pharmacists with other backgrounds and viewpoints had completed the analysis. In addition, a non-consensus-based approach, such as using an arbitrator to resolve discrepancies, might also have yielded different results.

The methods for this analysis provided a novel approach to compare standards of practice. Not only was the location of

alignment of standards compared, but the degree of alignment was assessed using a method first described in the education literature.<sup>19</sup> Utilization of such methods helped to highlight both the similarities and the differences among the 3 sets of standards and is consistent with work done in other health care disciplines.<sup>18</sup>

Given the results of this analysis, it is recommended that the 3 pharmacy standards be aligned, with adoption of a uniform approach, to ensure that pharmacy students, residents, educators, and practitioners use consistent language across the education spectrum. Ultimately, a national approach and consensus are needed for this to occur, with consideration of harmonization of the CPRB and NAPRA standards with the AFPC CanMEDS-type competencies, given that this CanMEDS format has been adopted in other Canadian health care professions (and in other countries).<sup>12,14,15</sup> Such well-aligned standards could form the basis for interprofessional discourse on clinical practice and education, as has been done across other health care professions.<sup>17</sup> In addition, thoughtful alignment of standards, including their structure and numbering systems, could further support research in this area (e.g., how well continuing education requirements align with undergraduate and postgraduate training standards), might reduce the accreditation burden for institutions and residency programs, could increase the ease of and potential for development of coherent milestone documents across the continuum of learning, and could aid in the development of specialized pharmacy training programs.<sup>8,18</sup> At the international level, thoughtfully aligned standards could facilitate alignment in practice between Canada and other countries, potentially assisting in professional mobility.<sup>18,22</sup> It is also important to consider that professional education is ultimately accountable to society to ensure that the considerable resources required to educate pharmacists are used wisely and that the education efforts will result in optimal effects on health care delivery. Well-aligned competency-based standards could help to support these mandates.<sup>23</sup>

## CONCLUSION

This comparative analysis has shown that the AFPC and NAPRA standards of pharmacy education and practice have both commonalities and differences in terms of alignment with the CPRB standards. These results are a first step in realigning standards across the pharmacy education continuum, in order to provide consistent and coordinated training for students and residents and continuing education for pharmacy practitioners.

### References

1. *Canadian Hospital Pharmacy Residency Board accreditation standards January 2010*. Ottawa (ON): Canadian Society of Hospital Pharmacists; 2009 [cited 2016 Aug 29]. pp. 15-7. Available from: [www.cshp.ca/programs/residencytraining/CPRB%20Standards%202010%20-%20FINAL.pdf](http://www.cshp.ca/programs/residencytraining/CPRB%20Standards%202010%20-%20FINAL.pdf)
2. *Educational outcomes for first professional degree programs in pharmacy (entry to practice pharmacy programs) in Canada*. Edmonton (AB): Association of Faculties of Pharmacy of Canada; 2010 [cited 2016 Aug 29]. pp. 8-20. Available from: <http://afpc.info/sites/default/files/AFPC%20Educational%20Outcomes.pdf>
3. *Professional competencies for Canadian pharmacists at entry to practice*. Ottawa (ON): National Association of Pharmacy Regulatory Authorities; 2014 [cited 2016 Aug 29]. pp. 8-23. Available from: [http://napra.ca/Content\\_Files/Files/Comp\\_for\\_Cdn\\_PHARMACISTS\\_at\\_EntrytoPractice\\_March2014\\_b.pdf](http://napra.ca/Content_Files/Files/Comp_for_Cdn_PHARMACISTS_at_EntrytoPractice_March2014_b.pdf)
4. Lockyer J, Silver I, Oswald A, Bullock G, Campbell C, Frank JR et al. The continuum of medical education. In: *Competence by design: reshaping Canadian medical education*. Ottawa (ON): Royal College of Physicians and Surgeons of Canada; 2014 [cited 2016 Jul 27]. pp. 130-41. Available from: [www.royalcollege.ca/rcsite/documents/educational-strategy-accreditation/royal-college-competency-by-design-ebook-e.pdf](http://www.royalcollege.ca/rcsite/documents/educational-strategy-accreditation/royal-college-competency-by-design-ebook-e.pdf)
5. Frank JR, Snell LS, Ten Cate O, Holmboe E, Carraccio C, Swing SR, et al. Competency-based medical education: theory to practice. *Med Teach*. 2010;32(8):638-45.
6. Brown T, Mailhot C, Schindel T, Waite N, Winslade N. *Levels of performance expected of students graduating from first professional degree programs in pharmacy in Canada: a supporting document to the 2010 educational outcomes for a first professional degree programs in pharmacy*. Edmonton (AB): Association of Faculties of Pharmacy of Canada; 2011 [cited 2016 Aug 8]. pp. 5-19. Available from: <https://www.afpc.info/sites/default/files/EO%20Levels%20of%20Performance%20May%202011%20AFPC%20Council.pdf>
7. Biggs JB, Collis KF. *Evaluating the quality of learning: the SOLO taxonomy (structure of the observed learning outcome)*. Toronto (ON): Academic Press; 1982.
8. Holmboe ES. Realizing the promise of competency-based medical education. *Acad Med*. 2015;90(4):411-3.
9. Canadian Hospital Pharmacy Residency Board. Canadian Hospital Pharmacy Residency Board 2010 accreditation standards workshop proceedings: levels and ranges document 2009. Ottawa (ON): Canadian Society of Hospital Pharmacists; 2009.
10. *The future of medical education in Canada (FMEC): a collective vision for MD education in Canada (final report)*. Ottawa (ON): Association of Faculties of Medicine of Canada; 2012.
11. *The future of medical education in Canada: a collective vision for post-graduate medical education in Canada*. Ottawa (ON): Association of Faculties of Medicine of Canada; 2012.
12. Frank JR, Snell L, Sherbino J, editors. *CanMEDS 2015 physician competency framework*. Ottawa (ON): Royal College of Physicians and Surgeons of Canada; 2015.
13. Glover Takahashi S, Waddell A, Kennedy M, Hodges B. Innovations, integration and implementation issues in competency-based training in postgraduate medical education. Ottawa (ON): FMEC PG [Future of Medical Education in Canada Postgraduate Project] Consortium; 2011.
14. Beggs C, Berg K, Hughes S, Millette D, Mousseau M, Vibert B, steering committee. *Essential competency profile for physiotherapists in Canada*. National Physiotherapy Advisory Group; 2009.
15. *Proposed practice competencies for speech-language pathologists in Canada*. Renfrew (ON): Council for Accreditation of Canadian University Programs in Audiology and Speech-Language Pathology; 2012 [cited 2016 Aug 8]. Available from: [www.cacup-aslp.ca/PDFs/English/SLP%20ENGLISH%20APRIL%202011.pdf](http://www.cacup-aslp.ca/PDFs/English/SLP%20ENGLISH%20APRIL%202011.pdf)
16. Campbell C, Silver I, Sherbino J, Ten Cate O, Holmboe ES; International CBME Collaborators. Competency-based continuing professional development. *Med Teach*. 2010;32(8):657-62.
17. Verma S, Paterson M, Medves J. Core competencies of health care professionals: what medicine, nursing, occupational therapy, and physiotherapy share. *J Allied Health*. 2006;25(2):109-15.
18. Andrew SE, Oswald A, Stobart K. Bridging the continuum: analysis of the alignment of undergraduate and postgraduate accreditation standards. *Med Teach*. 2014;36(9):1-8.
19. Castillo S, Mileham C, Hooper MC, Freed M. Oregon mathematics crosswalk to the common score state standards (CCSS). Salem (OR): Oregon Department of Education; 2010 [cited 2014 Jan 10]. pp. 1-10.

Available from: [www.ode.state.or.us/teachlearn/subjects/mathematics/standards/or-crosswalk-introduction.pdf](http://www.ode.state.or.us/teachlearn/subjects/mathematics/standards/or-crosswalk-introduction.pdf)

20. Crosswalks of 2017 with 2012 accreditation standards. Chicago (IL): Accreditation Council for Education in Nutrition and Dietetics; [cited 2016 Aug 22]. Available from: [www.eatrightacend.org/ACEND/content.aspx?id=6442485341](http://www.eatrightacend.org/ACEND/content.aspx?id=6442485341)
21. Rodger S, Clark M, Banks R, O'Brien M, Martinez K. A national evaluation of the Australian Occupational Therapy Competency Standards (1994): a multistakeholder perspective. *Aust Occup Ther J.* 2009;56(6):384-92.
22. Rodger S, Clark M, Banks R, O'Brien M, Martinez K. A comparison of international occupational therapy competencies: implications for Australian standards in the new millennium. *Aust Occup Ther J.* 2009;56(6):372-83.
23. Murray E, Gruppen L, Catton P, Hays R, Woolliscroft JO. The accountability of clinical education: its definition and assessment. *Med Educ.* 2000;34(10):871-9.

**Competing interests:** None declared.

**Address correspondence to:**

Dr Henry Halapy  
Pharmacy Department  
St Michael's Hospital  
30 Bond Street  
Toronto ON M5B 1W8

**e-mail:** [halapyh@smh.ca](mailto:halapyh@smh.ca)

**Funding:** None received.

**Acknowledgements:** The authors are grateful for assistance and pre-submission review of the manuscript by Dr Farhan Bhanji, Associate Professor of Pediatrics, McGill University, and by Dr Clarence Chant, Director of Pharmacy, St Michael's Hospital. As an Associate Editor with the *Canadian Journal of Hospital Pharmacy*, Dr Chant was not involved with decision-making for this article. This acknowledgements section was blinded during the review process, such that no editorial staff were aware of the acknowledgement details.

---

**Henry Halapy**, PharmD, ACPR, is with the Department of Pharmacy, St Michael's Hospital, and the Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario.

**Salma Satchu**, BScPhm, PharmD, ACPR, is with the Department of Pharmacy, St Michael's Hospital, Toronto, Ontario.

#### Appendix 1. Supplemental methods

The matching score of all substandards in a given competency were summed to determine the sum of matching scores for that competency. The percent alignment score was calculated for each role/competency category by comparing its sum of matching scores with its maximum possible sum of matching scores (which would be achieved if all substandards within a competency receive a matching score of 3). For example, as shown in Table 3, the care provider role of the Association of Faculties of Pharmacy of Canada has 43 standards and substandards, resulting in a maximum possible sum of matching scores of 129 (43 substandards multiplied by the maximum matching score of 3 points per substandard). Using the calculated sum of matching scores of 59, the resulting percent alignment score for this competency is 45.7%.